

8. A First Classification of Prehistoric Bone and Tooth Artifacts

based on material from Niah Great Cave

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A Summary by W. G. S.

[This is a shortened version of an article appearing in the *Sarawak Museum Journal*. Very little has been done so far on bone artifacts in Southeast Asia and Indonesia, however here is a suggested classification on the material. It also gives an idea of the use of bone at least in Borneo if not much further a field. In *SMJ* 11(19), 335-362 the fuller text of this paper contains detailed tables and 14 half-tone plates. Ed.]

1. INTRODUCTION

This is a classification of all the artifacts of bone and teeth which were excavated between 1954 and 1959 (Harrison 1959*a*, 1959*b*) at the mouths of the Great Cave, Niah: West Mouth (abbreviated as W.M.), Lobang Angus (L.A.), Lobang Tulang (L.T.), and Gan Kira (G.K.). The artifacts were classified into eighteen categories, based principally on their shape. For convenience' sake, accepted functional names have been given so far as is possible to the various categories, but in many cases the artifact's appearance gives no clear indication of its function. On the relationship of shape to use we are still very uncertain and are accordingly reluctant to impose any rigid concepts of function. The names used are descriptive of form only, and do *not* necessarily imply function.

Much more material was later excavated from other caves at Niah and from Gua Sirih, 300 miles to the south-west and compared with the earlier material. As it fits the following categories, these will therefore be used as a basis in further and fuller studies.

All the specimens mentioned are preserved in the Sarawak Museum reference collection. Measurements of the artifacts are in millimetres.

2. 'ARTIFACT'—A DEFINITION

Few large bones have been recovered whole from Niah (Medway 1960*a*). From the nature of the fractures it is evident that the majority were smashed before becoming part of the deposit, and that only a smaller proportion of the breaks are due to later compression. Many functional-looking shapes, such as sharp points, scoops or blades, occur among the fragments and instantly recall primitive tool types. But we have shown that exactly the same shapes occur when a fresh pig or deer shaft-bone is smashed by more or less undirected blows with a big stone to get its marrow. We assume that the same shapes recur among the archæological remains because their outline represents the natural fracture planes of these big mammal shaft-bones when subjected to such crude treatment.

If examined closely, the majority of the useful-looking archæological fragments of bone show no sign of abrasion. The fracture edges are rough and sharp, and bear no evidence of use as points or blades. *Only* those pieces of bone or tooth are accepted here as artifacts which bear indisputable signs of use after breaking, that is with marks showing either accessory grinding, or decoration, or polished or use-worn edges. The rest must be attributed to unused by-products of tool or ornament manufacture, or of marrow-eating or other food habits.

Bone also presents special difficulties because it is subject to animal interest, particularly in a country like Borneo where a wide range of animals are semi-scavenging in habit. Besides carnivores and monitor lizards, pig and particularly porcupine and smaller rodents are attracted to a smelly bone. Their activity may casually, produce a multiplicity of forms, some of which at first sight may be difficult to distinguish from the results of human activity. One great advantage of some Niah cave mouths is the protection which they give from most of such disturbance, with their cliffs or high screes. Even so rats are nearly always present as indigenous cave fauna, and it is seldom safe to exclude other intruders entirely. The deceptive nature of some animal gnawings is illustrated by a bone-rod shaped by an iron tool (butchery), into which a hole was gnawed; at first we thought this was a primitive whistle.

Tooth marks on bone attributable to dog, in the form of gnawing marks, small pricks and pits, are found only among remains from the uppermost levels of the West Mouth. This corresponds with the distribution of skeletal remains of dog (Clutton-Brock 1959). More widely, the double grooves made by the incisors of rodents are found, especially in Lobang Tulang; in several cases porcupine is indicated.

Metal blades are sharp enough to leave characteristic nicks on bone. These are considered as by-products of butchery, and are not included as artifacts. Such nicks are found only on bone that is fresh and obviously modern, probably within the last century. Most of the true artifacts considered here are shown by accompanying objects to be of pre-metal age.

3. DETAILED TREATMENT

A. Bone Carvings

Bone on or in which a design has been carved.

Examples:

1. Lobang Tulang (L.T.), 0-3 in. An animal head (resembling that of a horse) carved in the round and at least partly representational (B. Harrison 1958, fig. 5).
2. L.T., 0-3 in. Tubular artifact ('pipe stem') with a relief design.
- 3, 4. L.T., 0-3 in. Fragments with scroll-type design in relief.
5. W.M., J/K3, 0-6 in. The end of a bone flattened basally, broken off across a bored hole (? pendant; *cf.* E). On the upper, natural surface a face rather crudely and thinly scratched, with wide nose, slit eyes but wide sockets, tiny mouth, no distinct ears and a tapering, almost triangular cheek-line to chin. Length 10 mm., width 8-9 mm.

This carving was found in June 1959 far back uphill behind the cemetery, in an otherwise barren section, approaching cave darkness. It could be the head of some sort of pin. Stylistically, it is unlike anything else from Niah and clearly not related to the examples of carving from Lobang Tulang (1, 2). It bears a faint resemblance to some early megalithic decoration, as in the famed 'stone-coffin', of uncertain origin, on the Apo Kayan (as already mentioned by Harrison 1959c; with a drawing on p. 18).

B. Elaborate Accessories

Bone clearly shaped for some use—not itself always yet known—which may also be subsidiarily carved.

Example:

1. W.M., associated with neolithic burial 73; perhaps a knife handle. Round in cross section, finish rough, slightly pitted, not polished. Total length 82 mm., diameter at widest end 22 mm., thickness of bone 5 mm.

2. G. K., Y/ES, 0-6 in. Full length present, but split longitudinally and only one face remains. Round the broader end is a decorative band of small circles in relief between two lines; two roughly bored holes, diametrically opposed, at each side of this end. Total length 120 mm., breadth 35 mm., thickness of bone 4 mm.

3. W.M., D/NS: 24-30 in. Resembles a pin or clip, but pierced at top (? subsidiary pendant usage, E. below); broken. Made from metapodial of barking-deer (*Muntiacus muntjac*). Total length 75 mm., breadth 11 mm., thickness of bone 9.5 mm., diameter of hole 4 mm.

4. W.M., E/W77, 0-24 in. We previously referred to this artifact as a spear or harpoon head (Harrison 1959b), but it is probably better described as a bone 'pot-hook' used perhaps to hold a cooking pot over the fire. The bone is still fresh and it must be of a recent date. It was found among a large collection of pig bones, including mandible fragments of at least two individuals and some appendicular bones. The artifact is from the anterior symphysis of the mandibles of pig; the root cavities of the two central incisors are exposed on the upper surface, which is unworked. It has been roughly shaped by means of a sharp (iron?) blade; it is crudely hacked into shape, and no attempt has been made to grind the point or margins to sharp edges. The jawbone of a pig is already forked, and the natural V-shape has been utilized. Several similarly shaped (but apparently unworked) fragments are found at various depths throughout the deposit.

C. Rings

Undecorated, thin ring of bone. Its use both on fingers and as ear pendants is indicated by excavations in 1961 (see below page 228, paragraph 16).

Example:

1. W.M., X/1: at 1 in. Internal diameter 18 mm., thickness of rim 2 mm., depth of rim 3 mm.

D. Cylindrical Beads

A wide range of tubular beads made from small shaft bones of mammals and (less often) birds; or occasionally the centrum of a fish backbone, pierced in the longitudinal axis. Some specimens have fine lines incised around the circumference at both ends, symmetrically; others are undecorated, apart from a fine polish; and yet others are crudely finished and unpolished. The same types are matched in glass early in the metal age, and the two types of bead overlap at Lobang Tulang (See B. Harrisson 1958, for discussion).

E. Bone Pendants

Small pieces of bone bored with one or two holes eccentrically placed; a wide diversity of design within functional limits.

F. Plaques

Flattened oblongs with a hole in each corner.

G. Tooth Pendants

Commonly the canines of small carnivores, in most cases identified as the bear-cat, *Arctitis binturong*, bored with a single hole through the root, in the mesiodistal plane near the apex. Teeth of other species may be utilized; one example is a substitute, made of bone.

These artifacts have been found *in situ* strung into necklaces, often alternating with true beads. On many specimens subsidiary wear may be seen around the edges of the boring, due to friction between the beads on such a string; this is termed 'bead-wear'.

H. Tooth Plugs, Double-bored

Crown and root utilized. The root is bored with two holes in the longitudinal axis, towards the apex. The replacement boring in example (5) shows that both the two holes, and their orientation, were obligatory. Some examples have incised single-line decoration at apex.

Apparently the ideal source material desired was the canine of clouded leopard (*Neofelis nebulosa*). If other source material has been used, the artifact is more or less extensively worked to conform to the same shape. Such 'imitations' are in fact more frequent than the ideal type. Examples are from teeth of pig, bear and barking-deer.

The use of this artifact remains obscure. There are no signs of bead-wear, indicating pendant or related usage, on any of these specimens, and we have not seen any similar artifacts in a living context.

I. Tooth Plugs, Single-bored

Apex of the root is bluntly cut and bored with a single hole; some examples have additional decoration of incised lines. No bead-wear is evident. The shape of these

artifacts strongly suggests the male jewellery still worn today by many interior peoples through the upper lobe of the ear. One example is an imitation from bone. Other imitations in modern use are made of hornbill ivory (*Rhinoplax vigil*) which has a wide and ancient tradition, including as an export to China (Harrisson, in Smythies 1960), and has been found once in raw state at Gan Kira.

J. Bead Separators

An example from Lobang Tulang has already been described and discussed by B. Harrisson (1958: 612), who compares it to the lateral supports of bead 'hip-laces' (corsets) worn by Muruts, Kayans, Kelabits, as figured by Ling Roth (1896). The object is a length of bone, rectangular in cross-section, with rounded ends, bored at even intervals along the long axis of the wider face. The number of holes is variable, but otherwise all examples are of comparable size. All are finished with a glossy polish. Two examples are made of very dense bone. Dr F. C. Fraser has pointed out that the ribs of dugong are extremely dense, and may have provided the source material for these artifacts (*in litt.*).

K. Bone Clips

Small cylindrical artifacts probably made from the same source material as bone beads (above), but having a parallel-sided strip cut out along the entire length of one side, so that the cross-section is a rounded U.

L. Drifts and Rods

Short lengths of shaft bone without polish or ornamentation.

Examples:

1. W.M., W/E1, 0-12 in. The base is freshly fractured; the tip crudely gouge form, with the artificial face oblique to the axis of the bone. This face is coated in a hard encrustation (which may be the natural deposit bleached and hardened by oxidation and exposure). Length 74 mm., diameter 25×19 mm., length of worked face 24 mm.

2. W.M., W/E2, 6-12 in. This bone is still fresh and must have a recent date. It has apparently been scraped longitudinally by a sharp cutting tool, which has pared off thin slivers of bone. The surface has subsequently acquired a slight patina. Both ends of the artifact are rough breaks, unworked. Total length 105 mm., diameter 11.5 mm., thickness of bone 2 mm.

3. G.K., Y/A4, 24-30 in. A slender bone rod, with less conspicuous marks of longitudinal paring, obscured by subsequent grinding. One extremity is a recent break. Perhaps this is a fragmented gouge (Category Q). Total length 87 mm. diameter 4 mm.

4. W.M., E/W5, 0-3 in. The femur of a young monkey, proximal head present (epiphyses detached); cut in half neatly, mid-shaft, by a series of short blows with a sharp smooth cutting edge (? iron). Length 75 mm., diameter 8 mm. and thickness of bone 2 mm.

M. *Turtle Tools*

Made from the subdermal bone of chelonians, which underlies and is distinct from the carapace. The bone is thick and must have derived from large (perhaps marine) turtles.

All examples are fragmentary, showing signs of recent breakage. They are polished only on one side, the original external face. One example has had a large flake struck from the polished face. Most of the worked edges are rounded, but in another example, the edge is sharp.

An unfinished example indicates that some of these objects were made in the cave. To make the blank, the bone was apparently scored repeatedly with a sharp point until a groove was cut through about half its thickness; the final break must have been accomplished by pressure, or by a sharp blow. Pieces of chelonian carapace of the same thickness are found among the food remains of this deposit (Medway 1958a; cf. also King 1962).

N. *Pig-Tusk Tools*

These artifacts, all made from the lower canine of the bearded pig (*Sus barbatus*), fall into four classes.

a. '*Knives*'. To make this tool, the tusk was split longitudinally, and the exposed dentine ground away at an angle to the enamel, forming a long cutting edge roughly parallel to the axis of the tooth. The marks of grinding (against a coarse stone) are not effaced by polish. All examples exhibit recent fractures, but the finished artifact was clearly a long knife-like cutting tool.

b. '*Scrapers*'. Chips, roughly square in shape, from the lingual face of the tusk. The dentine is ground to make a sharp edge at right angles to the long axis of the tooth. In two examples the marks of grinding are overlaid by a polish that may have resulted from wear.

c. '*Chisels*'. A length of tusk, not split, ground obliquely to the transverse axis, so that a cutting edge is formed across the width of the lingual face. In one example marks of the grinding are obscured by polish.

d. '*Points*'. The occlusal apices of pig tusks, in all but one case split and worked to a sharper point.

O. *Awls*

Medium-sized bone shafts worked to a sharp point. The angle between the worked face and the long axis of the bone is small. As all the examples are broken or incomplete, their function is only hypothetical. Reconstruction of pieces from Kain Hitam, 1961, suggests in some cases a large hairpin (cf. Harrisson and Manis 1950; Harrisson 1955).

P. *Simple Points*

All are either small slivers split from large bone shafts or small bone shafts sharpened without splitting. Several have been recovered complete and show that, unlike

some 'Awls' (O. above), the finished tool was about 45 mm. long (range 35–64 mm.). There are two fairly distinct classes:

a. Flat points. Slivers from the long bones of medium-sized animals (the actual thickness of the bone is not great, and the curvature is often pronounced) worked to a point at one end. The edges are smoothed, either parallel or convex, converging slightly towards the base as well as the tip. The base in most cases an unfinished fracture, but in two cases has also been smoothed. The bone was worked by grinding; the finish is rough and marked with conspicuous parallel scratches from the fabricating surface (which must have been comparable to sandstone). Several examples appear to have been deliberately hardened by fire.

b. Rounded points. Whole small shaft-bones, round in cross-section, either worked to a taper or exploiting the natural pointed shape (e.g. tortoise rib, fish spines).

Q. Gouges

Medium shaft bones, often including the shaft-head intact, the worked face cutting obliquely across the long axis. All identifiable are limb bones of monkey (humerus, femur or radius). These always have a blunt or rounded tip, not a sharp tip as in the 'awls'.

R. Spatulas

Wide splinters from large bone-shafts (as opposed to medium shafts for gouge and awl; small or medium for points). Worked on one side only to a flat surface nearly or quite parallel to the long axis of the shaft, and terminating in a rounded end following the natural outer, original surface of the bone. Some have sharpened edges, and are perhaps cutting tools. For others the exact usage is unclear, though at upper levels pottery associations are indicated in the West Mouth (*cf.* Harrison 1959a, and Tweedie 1953: 62 on cave pot-making). In this category comes a broad range of types; all but one are the deepest artifacts found to date (below GR 1339, 39,600 years B.P.). We subdivide them into four classes.

a. The one complete specimen, made from a thick sliver of shaft-bone, worked to a flat spatulate point at one end, fire hardened. The base too is worked, to a pronounced flat face, obliquely angled.

b. Manufactured from a large sliver of big shaft-bone, worked to a wide crescentic point, with one margin markedly convex, the other straight with a suggestion of concavity. The edges have been carefully worked, first by minute flaking, then by longitudinal grinding against a coarsely granular stone, and finally polished.

c. Wide splinters from large bone shaft worked to crude spatulate form at one end (none have been recovered whole). The edges can be quite sharp.

d. The only unbroken specimen is a long trough-shaped fragment of shaft. The edges of the worked face are highly polished, but show no signs of deliberate grinding; they are wavy in outline, and not straight like the worked edges of 'gouges' (above). The inference is that the smooth edges of this tool are the result of *use* and not of deliberate shaping by grinding.

SUMMARY AND DISCUSSION

1. Many fragments of bone in the Niah Cave deposits represent the action of man. But we here accept as artifacts only those which bear clear signs of deliberate working or ornamentation, or of attrition through use.

2. On this basis, 206 objects, all definitely artifacts of bone and tooth (excavated over four seasons at Niah Great Cave, 1954-1959) are classified into eighteen categories. These categories are based on an analysis of shape and form, and are arranged in a broad sequence of decreasing elaboration or complexity: (A) Bone carvings, (B) Elaborate accessories, (C) Rings, (D) Cylindrical beads, (E) Bone pendants, (F) Plaques, (G) Tooth pendants, (H) Tooth plugs, double-bored, (I) Tooth plugs, single-bored, (J) Bead separators, (K) Bone clips, (L) Drifts and rods, (M) Turtle tools, (N) Pig-tusk tools, (O) Awls, (P) Simple points, (Q) Gouges, (R) Spatulas.

3. Comparable material from later excavations at Niah, and from other caves in West Borneo is compatible with this classification, which will serve as provisional basis for our further work. We expect it to be acceptable over a wider area, and to provide a factual basis for the comparison of artifacts of bone and tooth in archaeology over Southeast Asia in general.

4. The data in the original paper (*SMJ*), show that the more elaborate forms of artifact are confined to the most superficial levels, corresponding to late stone age and later. The first class, bone carvings (A), so far only occur in contexts which could be iron age (past *c.* 600 A.D. at Niah).

5. Other artifacts of ornamental or accessory use are mostly all concentrated in the upper levels, which are predominantly neolithic, merging on to early metal age. Cylindrical beads (D) and bead separators (J) in particular are characteristic of these periods. The latter, as well as tooth plugs (I), continue to the present. The scarcity or absence of parallel material in the older levels is noteworthy.

6. True *tools* of bone (L to R) have a wide distribution in depth. Proportional scarcity of examples at greater depth is likely to be due to: *a.* the increased difficulty of recovery at deeper levels, where all bone, including cooked or charred pieces, tends to decompose completely at around 100 inches depth (cf. Medway 1960*a*); *b.* the relatively much smaller area excavated at these depths at Niah to date.

7. Some of the categories proposed are 'unnatural' in the sense that they can include morphologically similar objects that in fact had different functions at different levels of culture. One example is the spatula (R), very widely distributed and including some of the deepest bone-tools found here so far. We have tried to avoid excessive sub-division in our categories, but here it was necessary to do so; it was also possible on more detailed morphological grounds. Other categories to show a wide distribution in depth are drifts and rods (L) and awls (O). In both cases we are not satisfied that these are not artificial groupings of functionally disparate objects; but we have no data to justify any other arrangement at present.

8. Hard simple points (P. *a*) are a homogenous class, strikingly concentrated in the middle levels and associated with the horizon of abundance of quartzite flakes (attributed to the fully palæolithic down to *c.* 32,000 B.C., Harrison 1959*b*).

9. Though most bone is less susceptible to intricate or variable working than stone, there is, so far, no other quantitative parallel between the two in visible changes and developments. The *stone* tools cannot be confused, seldom even overlapped, from different levels (Harrisson 1957).

10. The identity of the source material of these artifacts has often been obscured by the working. In cases where the origin is ascertainable, the animals concerned are chiefly mammals. Some bird bone has been utilized, principally in neolithic and later contexts (D); other artifacts are made from turtle bone (M), again chiefly from upper levels; and from fish (D, P. *b*). These vertebrate classes are all represented among the food remains (Medway 1958*a*, 1959*a* and *b*), but the number of objects fashioned from mammal bone, in proportion to the number made from bone of other vertebrates, is higher than the proportion of mammal bone to bone of the other classes among unworked food remains. This is evidence of deliberate selection of mammal bone as source material, particularly for tool types.

11. Of the mammals identified, pig (especially F, G, H, I and N) most frequently supplied the source material, followed by monkey (especially E and Q). These two are also by far the most abundantly represented mammals among the food remains (Hooijer 1960*a*, *b*, Koenigswald 1958, Medway 1958*a*, 1959*b*, 1960*a*). They are followed in order of frequency by the bear-cat, whose teeth quite evidently found favour as beads or pendants (E). Among unworked skeletal remains, bear-cat jaws were fifth in frequency, well after orang-utan and porcupine.

12. The selection of source material for artifacts roughly reflects the general frequency of mammals taken by these cave-users over the period. *Special* selectivity for specifically artifact use does not appear to be a marked factor.

13. Aquatic animals provided an appreciable amount of source material: fish (D, P. *b*), suspected dugong (F, J), and large chelonians including probable marine turtle (M). There is evidence that the turtle bone was worked in the cave.

14. A number of mammals either now extinct in Borneo or no longer found in the country round Niah have been identified from the food remains: orang utan (Hooijer 1960*a*), rhinoceros (Medway 1958*b*, 1959*b*), tapir (Medway 1959*a*, 1960*b*), tiger (Harrisson, Hooijer and Medway 1961), and the giant pangolin (Hooijer 1961*b*). None have yet been found in artifactual use. But a radius of the Sumatran rhinoceros, unshaped and therefore by our definition not an artifact, was utilized as a 'pillow' in a probably mesolithic extended contorted burial in the West Mouth (Harrisson 1957: plate P. *b*; now on permanent exhibit in the Sarawak Museum, 'Niah Cave Grotto'). There is no parallel to this usage of bone among 100 other Great Cave burials so far excavated at Niah; all other 'pillows' are of wood, and nearly all of these later neolithic (0-12 in.).

15. We have indications that bone and tooth artifacts have had their ups and downs, their 'vogues' and phases, in ways already known for stone-tools at Niah and widely. This will emerge more clearly now that we can work with a classification system—which we trust will be accepted as a basis by other archaeologists in the area and gradually improved upon. Hitherto, there was no regular classification for bone artifacts comparable to those accepted and well established for pottery, stone

tools, etc. (see, for instance, Michael Tweedie's treatment of bone in his otherwise comprehensive general survey for Malaya, 1953).

16. Here we also mention an important later site discovered at Niah about 2 miles from the Great Cave. When fully excavated in 1961, at least 50 complete burials and other material were identified, associated with rich pottery, some stone tools, a few shell artifacts and an elaborate funerary treatment in a strictly neolithic site. Nothing, with the exception of two small bone rings, that could possibly have been called a bone or tooth artifact, even within the wide scope of our classification, was present—under conditions where bone, including whole skeletons and associated matting, remained beautifully preserved.

17. It must be emphasised that at Niah, as in Borneo more generally, there is so far (upper Palæolithic to Iron) no sign of any specific separate 'bone-artifact culture'. Where such has been postulated in the later stone-ages elsewhere in the area (e.g. Java) these may prove over simplifications based on casual proportions of surviving material; or on special local factors (e.g. scarcity of stone or contrariwise). It seems unlikely, on Niah evidence, that bone and stone were *not* at the least 'associated' in stone-age use wherever fair supplies of both were available.

18. The notable absence of bone artifacts in some Malayan cave sites may in part be due to a local abundance of readily worked hard-stone available for tools. At Niah, as in West Borneo widely, artifactual stone may be extremely hard to come by (Harrisson 1957, *et seq.*)

19. In a few cases the somewhat hasty excavation methods used might have caused marginal bone to be thrown away unstudied—and the artifact scale thus perhaps to be underestimated. The 26 bone tools from the Bukit Chuping Cave Site in Perlis and now on permanent exhibition in the Raffles Museum, Singapore will repay study in Malaya, for they all fit readily into our categories; they are mostly awls and simple points, with 3 'beads' of fish-bone, similar to some from Niah.

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